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Paul R. McHugh

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EXAMINER

WILKINS III, HARRY D

ART UNIT

PAPER NUMBER

1742

DATE MAILED: 12/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/734,100

Applicant(s)

MCHUGH ET AL.

Examiner

Harry D. Wilkins, III

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1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 October 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☒ Claim(s) 21 and 25 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 9/8/05, 5/12/06, 10/27/06.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I (claims 1-28) in the reply filed on 27 October 2006 is acknowledged.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. The term "at least proximate" in the claims is a relative term which renders the claim indefinite. The term "at least proximate" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

5. Claim 18 is further rejected because in lines 8-9, "the electrode support" lacks antecedent basis.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claim 18-20 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Broadbent (US 6,027,631).

Broadbent anticipates the invention as claimed. Broadbent teaches (see abstract and figures 1-10) a system for processing workpieces (104) including a vessel (not shown) for containing an electrolyte and having a process location positioned to receive the workpiece, the process location having a center, a workpiece support being positioned to carry the workpiece at the process location and an electric field control element (shield 110) positioned along a flow path between the electrode support and the process location. The shield was configured to control an electrical current density in the electrolyte at the process location such that at a given radius from the center of the process location, there were (at least) two points having different current densities.

Regarding claims 19 and 20, Broadbent teaches (see col. 7, line 47 to col. 8, line 4) that various shapes were acceptable for the electric field control element (shield 110) including a solid plate with holes or slots.

Regarding claim 22, Broadbent teaches (see paragraph spanning cols. 3 and 4) that the shield may be attached by use of a mechanical collar. In that instance, the shield would be considered a gasket clamped between two portions.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Broadbent (US 6,027,631) in view of Powers et al (US 3,652,442).

The teachings of Broadbent are described above. However, Broadbent does not disclose or suggest including a paddle device as claimed.

Powers et al teach (see figures 1-2) a system for processing workpieces (14) including a paddle device (34) having a paddle, wherein the paddle is movable relative to the workpiece support. Powers et al teach that the paddle was movable back and forth relative to the process plane along a generally linear motion path. The walls of the vessel (10) adjacent the location of the paddle at least partially encloses an area which can be referred to as a paddle chamber.

Therefore, it would have been obvious to one of ordinary skill in the art to have added the paddle of Powers et al to the system of Broadbent for the known purpose of enhancing agitation at the processing plane. It would have been within the expected ability of one of ordinary skill in the art to have chosen to arrange the paddle either between the shield and the anode (claim 23) or between the shield and the cathode (claim 24).

10. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Keigler (US 6,251,250) in view of Bacon et al (US 4,466,864).

Keigler teaches (see abstract, figures 2-6 and col. 6, line 64 to col. 12, line 40) a system for processing workpieces including a vessel (20) configured to receive a processing fluid (24) and having a process plane to receive the workpiece, a workpiece

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support (90) positioned to carry the workpiece at the process plane during processing, a paddle device (40) having at least one paddle, wherein the paddle is movable relative to the workpiece support, and an electrode support (87) positioned to carry an electrode away from the process plane.

Thus, Keigler does not teach using a thieving electrode.

Bacon et al teach (see abstract, figure 3 and col. 3, line 64 to col. 5, line 15) including a "thieving" electrode as the outermost electrode to thief current at the periphery of the workpiece to reduce edge effects (i.e.-thicker deposits at the edges of the workpiece) in the electroplating process.

Therefore, it would have been obvious to one of ordinary skill in the art to have added a thieving electrode as taught by Bacon et al to the system of Keigler for the purpose of reducing edge effects.

Regarding claim 3, Keigler teaches (see col. 9, lines 47-54) including a contact electrode carried by the workpiece support to make electrical contact with the workpiece. Keigler further teaches an anode (80) spaced apart from the process location. Keigler and Bacon et al suggest a power supply coupled among the contact electrode, the thieving electrode and the anode. The power supply was capable of providing higher voltage to the anode than either the thieving electrode or the contact electrode.

11. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Keigler (US 6,251,250) in view of Bacon et al (US 4,466,864) as applied above to claim 1 and further in view of Woodruff et al (US 2001/0032788).

The teachings of Keigler and Bacon et al are discussed above. Neither reference discloses that the electrode support included a plurality of electrode chambers at least partially separated from each other by dielectric barriers, where gaps between the dielectric barriers formed a corresponding plurality of virtual electrode locations.

Woodruff et al teach (see abstract, figures 4-6 and paragraph 54) including a virtual electrode unit and dielectric walls with an electrode support, where the walls defined a plurality of electrode chambers. The virtual electrode unit had the advantage of being able to precisely control the electric field at the workpiece surface.

Therefore, it would have been obvious to one of ordinary skill in the art to have added the virtual electrode unit and dielectric walls of Woodruff et al to the system of Keigler and Bacon et al for the purpose of providing control of the electric field at the workpiece surface.

12. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakaki (JP 2001-64795 with reference to its English equivalent US 6,454,918) in view of Bacon et al (US 4,466,864).

Sakaki teaches (see figures 1 and 5) a system for processing workpieces (3) including a vessel configured to receive a processing fluid and having a process plane to receive the workpiece, a workpiece support (2) positioned to carry the workpiece at the process plane during processing, a paddle device (25/26) having at least one paddle, wherein the paddle is movable relative to the workpiece support, and an electrode support (87) positioned to carry an electrode away from the process plane.

Thus, Sakaki does not teach using a thieving electrode.

Bacon et al teach (see abstract, figure 3 and col. 3, line 64 to col. 5, line 15) including a "thieving" electrode as the outermost electrode to thief current at the periphery of the workpiece to reduce edge effects (i.e.-thicker deposits at the edges of the workpiece) in the electroplating process.

Therefore, it would have been obvious to one of ordinary skill in the art to have added a thieving electrode as taught by Bacon et al to the system of Sakaki for the purpose of reducing edge effects.

Regarding claim 3, Sakaki teaches (see paragraph spanning cols. 6 and 7) that the workpiece support include a cathode contact electrode for making electrical contact with the workpiece. Sakaki further teaches an anode (8) spaced apart from the process location. Sakaki and Bacon et al suggest a power supply coupled among the contact electrode, the thieving electrode and the anode. The power supply was capable of providing higher voltage to the anode than either the thieving electrode or the contact electrode.

13. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sakaki (JP 2001-64795 with reference to its English equivalent US 6,454,918) in view of Bacon et al (US 4,466,864) as applied above to claim 1 and further in view of Woodruff et al (US 2001/0032788).

The teachings of Sakaki and Bacon et al are discussed above. Neither reference discloses that the electrode support included a plurality of electrode chambers at least partially separated from each other by dielectric barriers, where gaps between the dielectric barriers formed a corresponding plurality of virtual electrode locations.

Woodruff et al teach (see abstract, figures 4-6 and paragraph 54) including a virtual electrode unit and dielectric walls with an electrode support, where the walls defined a plurality of electrode chambers. The virtual electrode unit had the advantage of being able to precisely control the electric field at the workpiece surface.

Therefore, it would have been obvious to one of ordinary skill in the art to have added the virtual electrode unit and dielectric walls of Woodruff et al to the system of Sakaki and Bacon et al for the purpose of providing control of the electric field at the workpiece surface.

14. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakaki (US 6,875,333) in view of Bacon et al (US 4,466,864).

Sakaki teaches (see figures 1-3) a system for processing workpieces (W) including a vessel (10) configured to receive a processing fluid and having a process plane to receive the workpiece, a workpiece support (20) positioned to carry the workpiece at the process plane during processing, a paddle device (40) having a paddle, wherein the paddle is movable relative to the workpiece support, and an electrode support (33) positioned to carry an electrode away from the process plane.

Thus, Sakaki does not teach using a thieving electrode.

Bacon et al teach (see abstract, figure 3 and col. 3, line 64 to col. 5, line 15) including a "thieving" electrode as the outermost electrode to thief current at the periphery of the workpiece to reduce edge effects (i.e.-thicker deposits at the edges of the workpiece) in the electroplating process.

Therefore, it would have been obvious to one of ordinary skill in the art to have added a thieving electrode as taught by Bacon et al to the system of Sakaki for the purpose of reducing edge effects.

Regarding claim 3, Sakaki teaches (see col. 7, lines 28-34) that the workpiece support include a cathode contact electrode for making electrical contact with the workpiece. Sakaki further teaches an anode (33) spaced apart from the process location. Sakaki and Bacon et al suggest a power supply coupled among the contact electrode, the thieving electrode and the anode. The power supply was capable of providing higher voltage to the anode than either the thieving electrode or the contact electrode.

15. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sakaki (US 6,875,333) in view of Bacon et al (US 4,466,864) as applied above to claim 1 and further in view of Woodruff et al (US 2001/0032788).

The teachings of Sakaki and Bacon et al are discussed above. Neither reference discloses that the electrode support included a plurality of electrode chambers at least partially separated from each other by dielectric barriers, where gaps between the dielectric barriers formed a corresponding plurality of virtual electrode locations.

Woodruff et al teach (see abstract, figures 4-6 and paragraph 54) including a virtual electrode unit and dielectric walls with an electrode support, where the walls defined a plurality of electrode chambers. The virtual electrode unit had the advantage of being able to precisely control the electric field at the workpiece surface.

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Therefore, it would have been obvious to one of ordinary skill in the art to have added the virtual electrode unit and dielectric walls of Woodruff et al to the system of Sakaki and Bacon et al for the purpose of providing control of the electric field at the workpiece surface.

16. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Powers et al (US 3,652,442) in view of Bacon et al (US 4,466,864).

Powers et al teach (see figures 1-2) a system for processing workpieces (14) including a vessel (10) configured to receive a processing fluid and having a process plane to receive the workpiece, a workpiece support (16) positioned to carry the workpiece at the process plane during processing, a paddle device (34) having a paddle, wherein the paddle is movable relative to the workpiece support, and an electrode support (28) positioned to carry an electrode away from the process plane.

Thus, Powers et al do not teach using a thieving electrode.

Bacon et al teach (see abstract, figure 3 and col. 3, line 64 to col. 5, line 15) including a "thieving" electrode as the outermost electrode to thief current at the periphery of the workpiece to reduce edge effects (i.e.-thicker deposits at the edges of the workpiece) in the electroplating process.

Therefore, it would have been obvious to one of ordinary skill in the art to have added a thieving electrode as taught by Bacon et al to the system of Powers et al for the purpose of reducing edge effects.

Regarding claim 3, Powers et al teach (see col. 4) that the workpiece support include a cathode contact electrode for making electrical contact with the workpiece.

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Powers et al further teaches an anode (26) spaced apart from the process location.

Powers et al and Bacon et al suggest a power supply coupled among the contact electrode, the thieving electrode and the anode. The power supply was capable of providing higher voltage to the anode than either the thieving electrode or the contact electrode.

17. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Powers et al (US 3,652,442) in view of Bacon et al (US 4,466,864) as applied to claim 1 above, and further in view of Browne et al (US 6,955,747).

The teachings of Powers et al and Bacon et al are described above. Powers et al teach that the paddle was movable back and forth relative to the process plane along a generally linear motion path. The walls of the vessel (10) adjacent the location of the paddle at least partially encloses an area which can be referred to as a paddle chamber.

However, Powers et al fail to teach including multiple paddles.

Browne et al teach (see abstract, figure 3 and col. 3, lines 32-35) that it was possible to use multiple paddles attached to a single cam for providing agitation within an electroplating cell of similar configuration as the cell of Powers et al.

Therefore, it would have been obvious to one of ordinary skill in the art to have utilized multiple paddles as suggested by Browne et al in the cell of Powers et al for providing an adequate and desired stirring action.

18. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andricacos et al (US 5,516,412) in view of Bacon et al (US 4,466,864).

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Andricacos et al teach (see figures 1-4) a system for processing workpieces (14) including a vessel (12) configured to receive a processing fluid and having a process plane to receive the workpiece, a workpiece support (18) positioned to carry the workpiece at the process plane during processing, a paddle device (28) having a paddle, wherein the paddle is movable relative to the workpiece support, and an electrode support (22) positioned to carry an electrode away from the process plane.

Thus, Andricacos et al do not teach using a thieving electrode.

Bacon et al teach (see abstract, figure 3 and col. 3, line 64 to col. 5, line 15) including a "thieving" electrode as the outermost electrode to thief current at the periphery of the workpiece to reduce edge effects (i.e.-thicker deposits at the edges of the workpiece) in the electroplating process.

Therefore, it would have been obvious to one of ordinary skill in the art to have added a thieving electrode as taught by Bacon et al to the system of Andricacos et al for the purpose of reducing edge effects.

Regarding claim 3, Andricacos et al teach (see e.g.-claim 1) that the workpiece support include a cathode contact electrode for making electrical contact with the workpiece. Andricacos et al further teaches an anode (22) spaced apart from the process location. Andricacos et al and Bacon et al suggest a power supply coupled among the contact electrode, the thieving electrode and the anode. The power supply was capable of providing higher voltage to the anode than either the thieving electrode of the contact electrode.

19. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Andricacos et al (US 5,516,412) in view of Bacon et al (US 4,466,864) as applied to claim 1 above, and further in view of Browne et al (US 6,955,747).

The teachings of Andricacos et al and Bacon et al are described above. Andricacos et al teach that the paddle was movable back and forth relative to the process plane along a generally linear motion path. The walls of the vessel (12) adjacent the location of the paddle at least partially encloses an area which can be referred to as a paddle chamber

However, Andricacos et al fail to teach including multiple paddles.

Browne et al teach (see abstract, figure 3 and col. 3, lines 32-35) that it was possible to use multiple paddles attached to a single cam for providing agitation within an electroplating cell of similar configuration as the cell of Andricacos et al.

Therefore, it would have been obvious to one of ordinary skill in the art to have utilized multiple paddles as suggested by Browne et al in the cell of Andricacos et al for providing an adequate and desired stirring action.

20. Claims 1-3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Browne et al (US 6,955,747) in view of Bacon et al (US 4,466,864).

Browne et al teach (see figures 3-4) a system for processing workpieces (wafer) including a vessel (304) configured to receive a processing fluid and having a process plane to receive the workpiece, a workpiece support (306) positioned to carry the workpiece at the process plane during processing, a paddle device (318) having a

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paddle, wherein the paddle is movable relative to the workpiece support, and an electrode support (312) positioned to carry an electrode away from the process plane.

Thus, Browne et al do not teach using a thieving electrode.

Bacon et al teach (see abstract, figure 3 and col. 3, line 64 to col. 5, line 15) including a "thieving" electrode as the outermost electrode to thief current at the periphery of the workpiece to reduce edge effects (i.e.-thicker deposits at the edges of the workpiece) in the electroplating process.

Therefore, it would have been obvious to one of ordinary skill in the art to have added a thieving electrode as taught by Bacon et al to the system of Browne et al for the purpose of reducing edge effects.

Regarding claim 3, Browne et al teach (see e.g.-col. 4, lines 12-21) that the workpiece support include a cathode contact electrode for making electrical contact with the workpiece. Browne et al further teaches an anode (312) spaced apart from the process location. Browne et al and Bacon et al suggest a power supply coupled among the contact electrode, the thieving electrode and the anode. The power supply was capable of providing higher voltage to the anode than either the thieving electrode or the contact electrode.

Regarding claim 5, Browne et al teach (see abstract, figure 3 and col. 3, lines 32-35) that it was possible to use multiple paddles attached to a single cam for providing agitation within an electroplating cell. The walls of the vessel (304) adjacent the location of the paddle at least partially encloses an area which can be referred to as a paddle chamber.

21. Claims 6, 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reid et al (US 6,214,193) in view of Browne et al (US 6,955,747).

Reid et al teach (see figure 1) a system for processing workpieces ('W') including a vessel (112) configured to receive a first processing fluid and having a process plane for the workpiece, a workpiece support (190) positioned to carry a workpiece at the process plane and a nozzle (160) able of coupling to a source of a second processing fluid positioned above the process plane to direct a stream of the second processing fluid toward the workpiece to rinse the workpiece.

Thus, Reid et al fail to teach a paddle device within the vessel at the process plane.

As above, Browne et al disclose positioning a paddle device adjacent the processing plane of a workpiece to be processed for providing agitation of the fluid to enhance the processing step.

Therefore, it would have been obvious to one of ordinary skill in the art to have added a paddle device as disclosed by Browne et al for the known purpose of enhancing agitation at the processing plane.

Regarding claim 7, Reid et al disclose (see figure 1) that the workpiece support was movable between two positions (2 and 3), the first for contacting the electroplating solution (first processing solution) and the second for rinsing of the workpiece by the nozzle (160) with clean water (second processing fluid).

Regarding claim 9, Browne et al teach (see abstract, figure 3 and col. 3, lines 32-35) that it was possible to use multiple paddles attached to a single cam for providing

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agitation within an electroplating cell. The walls of the vessel (304) adjacent the location of the paddle at least partially encloses an area which can be referred to as a paddle chamber.

[It is noted that Browne et al is not the only reference teaching the claimed paddle device. However, Browne et al is the only one capable of rejecting claim 9. Thus, the Examiner considers claim 6 rejectable over the combination of Reid with any one of Keigler, either Sakaki reference, Powers et al or Andricacos et al for similar reasons, but does not do so to reduce the number of rejections present in this Office Action.]

22. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Reid et al (US 6,214,193) in view of Browne et al (US 6,955,747) as applied above to claim 6 and further in view of Woodruff et al (US 2001/0032788).

The teachings of Reid et al and Browne et al are discussed above. Neither reference discloses that the electrode support included a plurality of electrode chambers at least partially separated from each other by dielectric barriers, where gaps between the dielectric barriers formed a corresponding plurality of virtual electrode locations.

Woodruff et al teach (see abstract, figures 4-6 and paragraph 54) including a virtual electrode unit and dielectric walls with an electrode support, where the walls defined a plurality of electrode chambers. The virtual electrode unit had the advantage of being able to precisely control the electric field at the workpiece surface.

Therefore, it would have been obvious to one of ordinary skill in the art to have added the virtual electrode unit and dielectric walls of Woodruff et al to the system of

Reid et al and Browne et al for the purpose of providing control of the electric field at the workpiece surface.

23. Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Woodruff et al (US 2001/0032788) in view of Keigler (US 6,251,250).

Woodruff et al teach (see figures 4-6) a system for processing workpieces (101) including a vessel (204), a workpiece support (160) and an electrode support (530+510) as claimed.

Thus, Woodruff et al fail to teach including a paddle device as claimed.

Keigler teaches (see abstract, figures 2-6 and col. 6, line 64 to col. 12, line 40) a similar system for processing workpieces including a paddle device (40) having at least one paddle, wherein the paddle is movable relative to the workpiece support, and functions to improve agitation of the electrolyte at the processing location.

Therefore, it would have been obvious to one of ordinary skill in the art to have added a paddle device as taught by Keigler to the apparatus of Woodruff et al for the purpose of enhancing agitation at the processing location.

Regarding claim 11, Woodruff et al teach (see figures 4-6) including multiple electrodes 600 disposed in the corresponding electrode chambers.

Regarding claim 12, the plurality of electrodes disclosed by Woodruff et al are capable of operation independent of each other, even at opposite polarities. Thus, any one of the electrodes (600) of Woodruff et al would have been capable of operating as an electrode thief.

[It is noted that Keigler is not the only reference teaching the claimed paddle device. However, Keigler appears to have the most similar cell design (i.e.-face down electroplating with anodes below the wafer). Thus, the Examiner considers claim 10 rejectable over the combination of Woodruff et al with any one of Browne et al, either Sakaki reference, Powers et al or Andricacos et al for similar reasons, but does not do so to reduce the number of rejections present in this Office Action.]

24. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Woodruff et al (US 2001/0032788) in view of Keigler (US 6,251,250) as applied above to claim 10 and further in view of Bacon et al (US 4,466,864).

Although the electrodes 600 of Woodruff et al were capable of operating as thieving electrodes, there is no specific teaching of utilizing them as such.

Bacon et al teach (see abstract, figure 3 and col. 3, line 64 to col. 5, line 15) including a "thieving" electrode as the outermost electrode to thief current at the periphery of the workpiece to reduce edge effects (i.e.-thicker deposits at the edges of the workpiece) in the electroplating process.

Therefore, it would have been obvious to one of ordinary skill in the art to have operated the outermost electrode (600d) of Woodruff et al as a thieving electrode as taught by Bacon et al for the purpose of reducing edge effects.

25. Claims 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Woodruff et al (US 2001/0032788) in view of Andricacos et al (US 5,312,532).

Woodruff et al teach (see figures 4-6) a system for processing workpieces (101) including a vessel (204), a workpiece support (160) and an electrode support (530+510)

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as claimed. The electrode support of Woodruff et al was capable of being moved. By removing the distributor (300) and the bottom of vessel (204) (plenum 330), the electrode support was capable of being removed along a motion path that does not pass through the process plane.

Thus, Woodruff et al do not teach a magnet as claimed.

Andricacos et al teach (see figure 2a and col. 5, lines 38-64) including a permanent magnet with an electroplating cell for the purpose of providing an axis-orienting magnetic field to orient the electroplated material.

Therefore, it would have been obvious to one of ordinary skill in the art to have added a permanent magnet to the apparatus of Woodruff et al as taught by Andricacos et al for imparting a desired orientation to the electroplated material.

Regarding claim 16, the plurality of electrodes disclosed by Woodruff et al are capable of operation independent of each other, even at opposite polarities. Thus, any one of the electrodes (600) of Woodruff et al would have been capable of operating as an electrode thief.

Regarding claim 17, Andricacos et al teach (see abstract, figure 1 and col. 3, lines 14-18) including a paddle (26) adjacent the processing plane. Therefore, it would have been obvious to one of ordinary skill in the art to have added a paddle device as taught by Andricacos et al to the apparatus of Woodruff et al for the purpose of enhancing agitation at the processing location.

[It is noted that Andricacos et al is not the only reference teaching the claimed magnet. However, Andricacos et al appear to have the best showing of a motivation to

combine. Thus, the Examiner considers claim 13 rejectable over the combination of Woodruff et al; with either of Browne et al or Powers et al for similar reasons, but does not do so to reduce the number of rejections present in this Office Action.]

[It is also noted that Andricacos et al is not the only reference teaching the claimed paddle device. However, Andricacos et al was already being applied in the rejection of claim 13. Thus, the Examiner considers claim 17 rejectable over the combination of Woodruff et al with any one of Browne et al, either Sakaki reference, Powers et al or the other Andricacos et al reference for similar reasons, but does not do so to reduce the number of rejections present in this Office Action.]

26. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Woodruff et al (US 2001/0032788) in view of Andricacos et al (US 5,312,532) as applied above to claim 13 and further in view of Bacon et al (US 4,466,864).

Although the electrodes 600 of Woodruff et al were capable of operating as thieving electrodes, there is no specific teaching of utilizing them as such.

Bacon et al teach (see abstract, figure 3 and col. 3, line 64 to col. 5, line 15) including a "thieving" electrode as the outermost electrode to thief current at the periphery of the workpiece to reduce edge effects (i.e.-thicker deposits at the edges of the workpiece) in the electroplating process.

Therefore, it would have been obvious to one of ordinary skill in the art to have operated the outermost electrode (600d) of Woodruff et al as a thieving electrode as taught by Bacon et al for the purpose of reducing edge effects.

27. Claims 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Woodruff et al (US 2001/0032788) in view of Browne et al (US 6,955,747).

The teachings of Woodruff et al are described above. Woodruff et al teach (see figure 3) that the workpiece support was capable of rotating the workpiece relative to the vessel.

Thus, Woodruff et al fail to teach a paddle device as claimed.

Browne et al disclose (see abstract, figures 3 and 4 and col. 4) positioning a paddle device capable of generally linear motion adjacent the processing plane of a workpiece to be processed for providing agitation of the fluid to enhance the processing step.

Therefore, it would have been obvious to one of ordinary skill in the art to have added a paddle device as disclosed by Browne et al to the system of Woodruff et al for the known purpose of enhancing agitation at the processing plane.

Regarding claim 27, Browne et al teach (see abstract, figure 3 and col. 3, lines 32-35) that it was possible to use multiple paddles attached to a single cam for providing agitation within an electroplating cell.

Regarding claim 28, Browne et al teach (see figure 4) including a magnet positioned to impart a magnetic field at the processing location. One of ordinary skill in the art was well aware that the magnetic field was provided in order to impart a desired orientation to the electroplated material.

Therefore, it would have been obvious to one of ordinary skill in the art to have added a magnet as taught by Browne et al for the purpose of imparting a desired orientation to the electroplated material.

[It is noted that Browne et al is not the only reference teaching the claimed paddle device. However, Browne et al is the only one capable of rejecting both claims 27 and 28. Thus, the Examiner considers claim 26 rejectable over the combination of Woodruff et al with any one of Keigler, either Sakaki reference, Powers et al or either Andricacos et al reference for similar reasons, but does not do so to reduce the number of rejections present in this Office Action.]

Allowable Subject Matter

28. Claims 21 and 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and to overcome (1) the rejection under 35 USC 112, 2nd paragraph above and (2) the obviousness-type double patenting rejections below.

29. The following is a statement of reasons for the indication of allowable subject matter: the subject matter of these claims are deemed to structurally distinguish the claimed invention from the teachings of the prior art.

Double Patenting

30. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct

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from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

31. Claims 1-28 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-47 of copending Application No. 10/734,098. Although the conflicting claims are not identical, they are not patentably distinct from each other because each and every limitation of the present claims are present within either the claims of the '098 application, or are known variations of that subject matter based on the various references discussed above.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

32. Claims 1-31 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-47 of copending Application No. 10/733,807. Although the conflicting claims are not identical, they are not patentably distinct from each other because each and every limitation of the present claims are present within either the claims of the '098 application, or are

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known variations of that subject matter based on the various references discussed above.

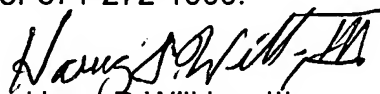
This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D. Wilkins, III whose telephone number is 571-272-1251. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Harry D Wilkins, III
Primary Examiner
Art Unit 1742

